

STANDARD OPERATING PROCEDURES:

15. CLEANING AND DISINFECTION

FAD PReP

**Foreign Animal Disease
Preparedness & Response Plan**



**United States
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The Foreign Animal Disease Preparedness and Response Plan (FAD PReP) Standard Operating Procedures (SOPs) provide operational guidance for responding to an animal health emergency in the United States.

These draft SOPs are under ongoing review. This document was last updated in **November 2013**. Please send questions or comments to:

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15.1 Introduction

The cleaning and disinfection (C&D) of equipment, materials, and premises is done to prevent or mitigate the spread of foreign animal diseases (FADs) during an outbreak in order to stabilize animal agriculture, the food supply, and the economy, and to protect public health and the environment. This standard operating procedure (SOP) provides C&D Group personnel with guidance on choosing and using optimal C&D methods following an FAD outbreak in domestic livestock and poultry.

Several key Animal and Plant Health Inspection Service (APHIS) documents complement this SOP and provide further detail when necessary. This SOP references the following APHIS documents:

- Foreign Animal Disease Preparedness and Response Plan (FAD PReP)/National Animal Health Emergency Management System (NAHEMS) Guidelines:
 - Cleaning and Disinfection
 - Wildlife Management and Vector Control
- FAD PReP SOP:
 - Biosecurity
 - Disposal
 - Health and Safety and Personal Protective Equipment (PPE).

These documents are available on the internal APHIS FAD PReP website for those who have access to the APHIS intranet at <http://inside.aphis.usda.gov/vs/em/fadprep.shtml>, and the public can access them at http://www.aphis.usda.gov/animal_health/emergency_management/.

15.1.1 General

During an FAD outbreak, C&D is an important component of a biosecurity program. C&D is an effective means of lessening the threat of animal diseases by reducing the presence of pathogenic microorganisms and preventing the spread of disease agents. C&D involves the use of physical, chemical, or biological processes to remove, inactivate, reduce, or destroy pathogenic microorganisms.

Specifically, cleaning involves the removal of organic material (for example, manure and bedding), and washing removes materials (for example, oils and grease) that can inhibit the action of disinfectants. Disinfection is a process that destroys most pathogenic and non-pathogenic microorganisms, but not all microbial forms, such as bacterial spores, to an acceptable level. Sterilization is a process that destroys all forms of microbial life, including bacterial spores, to an acceptable level. If conducted properly, these processes should be highly effective in preventing the spread of disease and zoonoses (if applicable).¹

¹ Block, S., (Ed.) (2001). Disinfection, Sterilization, and Preservation, 5th Edition (Lippincott, Williams, and Wilkins, Philadelphia, PA), pp. 25–27.

15.1.2 Goals

15.1.2.1 Preparedness Goals

The preparedness goals for C&D are as follows:

- Establish cleaning and disinfecting protocols or procedures before an outbreak for consistency and safeguarding.
- Identify disinfectants (or pesticides) that are Environmental Protection Agency (EPA) approved for specific FAD agents. Have the ability to acquire these disinfectants, both in finite immediate quantities for the start of an FAD incident or outbreak and in indefinite estimated quantities for surge capacity requirements beyond the initial immediate need.

15.1.2.2 Response Goals

The response goals for C&D are as follows:

- Ensure that C&D is conducted on any premises where a disease agent is presumed or confirmed to exist within 48 hours of disposal of depopulated animals.
- Remove, inactivate, reduce, or destroy pathogens at infected premises.

15.1.3 Guidelines

Proper cleaning and disinfecting is essential to contain the spread of a disease agent and is an integral part of the eradication plan. Pest control must be completed before C&D can commence. Care must be taken to reduce the generation and dispersal of infective dust and aerosols. If items cannot be adequately cleaned and disinfected, they must be disposed of by burial, burning, or other appropriate means.

If available personnel or materials are insufficient, Incident Command can request emergency 3D (depopulation, disposal, and decontamination) contractor support from the National Veterinary Stockpile (NVS).

15.1.4 Coordination

The C&D Group must complete the following coordination activities:

- Consult with the Epidemiology Group² to gain a better understanding of the disease and its properties so that an effective C&D strategy can be developed. Include in the C&D strategy a discussion of the environmental conditions (for example, relative humidity and temperature) that may impact the strategy.
- Coordinate supply requirements and delivery location, date, and time with the Logistics Section.
- Coordinate facility access and personnel requirements with the Operations Section Chief.
- Coordinate personnel supplies and needs with the Logistics Section.

² In situations without an activated Epidemiology Group, such as a small-scale event, the C&D Group will consult with the Operations Section Chief.

-
- Coordinate setting up C&D stations that adhere to biosecurity measures such as vehicle entry and movement control checkpoints with the Animal Biosecurity and Disease Prevention Group.
 - Coordinate with the Disposal Group to ensure that the C&D and disposal processes are properly conducted.
 - Coordinate with the property owner to ensure a smooth effort.

15.1.5 Assumed Ongoing or Completed Response Activities

These procedures assume the following outbreak response activities are in progress or have been completed before C&D:

- Disease confirmation—*completed/ongoing*
- Movement control—*ongoing*
- Quarantine—*ongoing*
- Surveillance—*ongoing*
- Monitoring, countermeasure use, and inoculation—*ongoing*
- Biosecurity procedures—*ongoing*
- Security measures and crowd control—*completed/ongoing*
- Health and safety procedures—*ongoing*
- Effluent and runoff control—*ongoing*
- Appraisal and compensation—*completed*
- Depopulation—*completed/ongoing*
- Disposal—*completed/ongoing*.

15.2 Purpose

The C&D SOP provides USDA APHIS Veterinary Services (VS) and other official response personnel with operational guidance on cleaning and disinfecting procedures for animal health emergency deployments. The guidance in this SOP is relevant in FAD outbreaks of varying sizes, whether the outbreak is isolated to a single premises or spans across a region to multiple premises, because the Incident Command System (ICS) structure from which this SOP is based is both flexible and scalable. These procedures serve as guidance for response personnel performing C&D activities. If these procedures conflict with State, Tribal, Territorial, or local laws, regulations, or procedures, always follow the laws within your jurisdiction.

15.3 Responsibilities

The C&D Group is part of the Operations Section (see Figure 15-1 for an example of the ICS structure). The C&D Group provides services that are essential to an effective animal health emergency response by helping control and eliminate the disease agent. This section describes the responsibilities of C&D personnel as well as the importance of cooperation with the

Disposal, Euthanasia, and Appraisal Groups. This SOP also addresses the topics of hazard communication, exercising biosecurity measures, personnel orientation, and needs assessment.

All C&D personnel should learn as much as possible about the procedures described in this SOP, the NAHEMS Guidelines: Cleaning and Disinfection, and other information sources. They also should participate in educational sessions and emergency response exercises designed to help them expand their knowledge of C&D processes, methods, and safety considerations (see [Attachment 15.A](#) for suggested training courses).

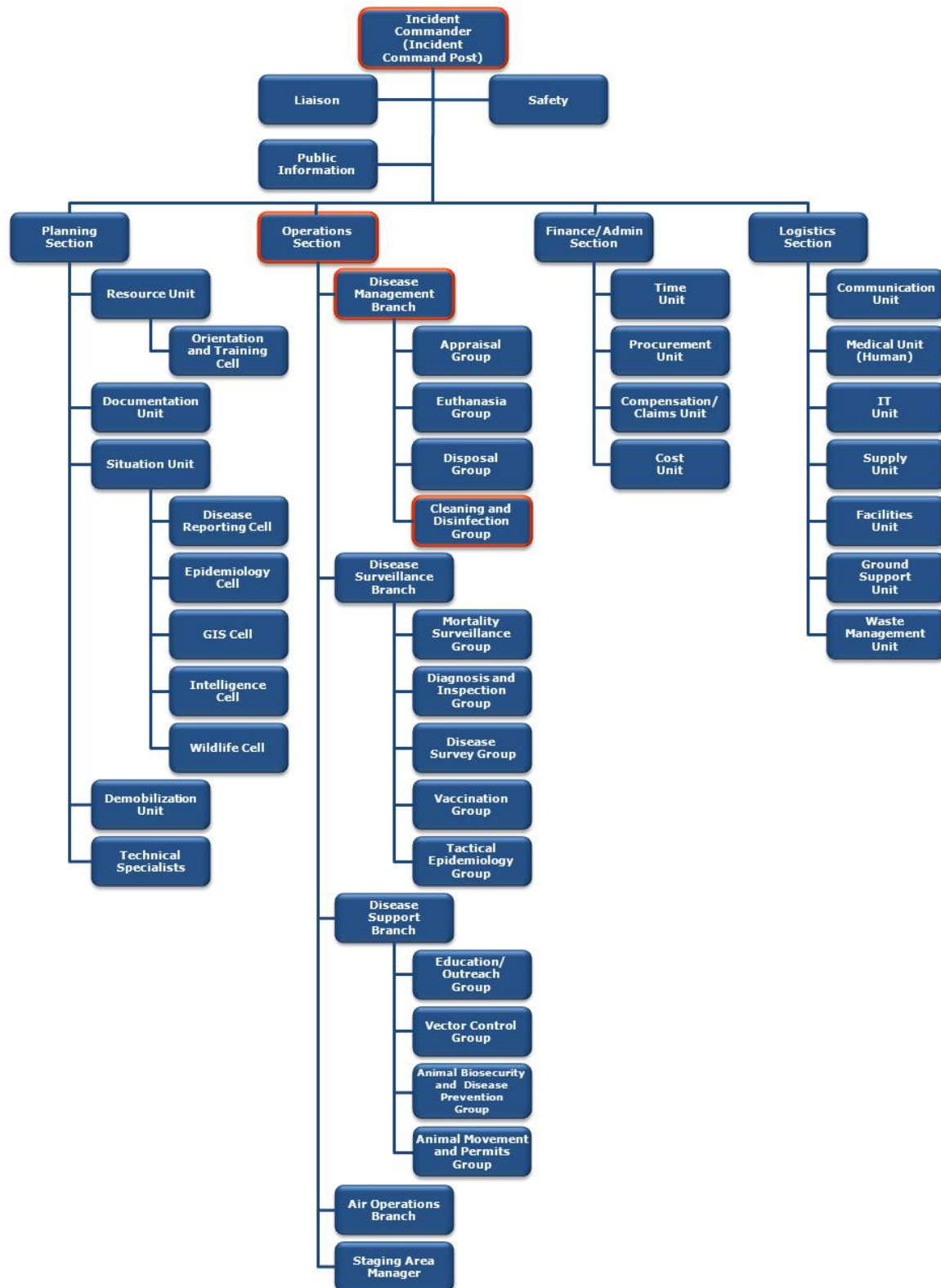
The Incident Commander (IC) oversees all activities (Planning, Operations, Finance/Administration, and Logistics). In large scale incidents involving multiple premises and covering large areas, the IC reports to an Area Commander.

The C&D Group is led by the C&D Group Supervisor, who reports to the Disease Management Branch Director. Depending on the incident, the C&D Group Supervisor may deploy a C&D Group Strike Team or Task Force. Strike Teams are groups that have expertise in and complete a specific skill whereas Task Forces are composed of personnel with more generalized but varied skills. See Figure 15-2 for the C&D Group command structure.

In general, the C&D Group is responsible for the following:

- Providing input on C&D procedures (for example, technical advice, briefings, and daily reports).
- Providing technical advice on C&D issues to owners or operators of Infected or Contact Premises.
- Coordinating closely with the Logistics Section to secure the necessary equipment and supplies and ensure an ample supply of chemical disinfectant products.
- Coordinating C&D Team activities with other response teams (for example, Surveillance, Appraisal, and Biosecurity).
- Establishing, operating, and maintaining C&D stations as needed, including quarantined premises, personnel, and animal decontamination stations.
- Providing personnel to supervise C&D activities.
- Scheduling and certifying C&D procedures on the Infected Premises (IP) or other affected areas.
- See Figure 15-2 depicts the C&D Incident Command structure.

Figure 15-1. Example of Incident Command Structure



Note: GIS = Geographical Information Systems; IT = Information Technology.

Figure 15-2. C&D Incident Command Structure



15.3.1 Cleaning and Disinfection Group Supervisor

The C&D Group Supervisor is assigned to the Incident Command Post and manages all C&D Teams (Strike Team and Task Force) and C&D Team members if their expertise is required. The C&D Group Supervisor has extensive training and experience in proper C&D methods following an FAD outbreak. This individual also possesses the management skills to organize and direct all C&D activities for an incident. The C&D Group Supervisor reports to the Disease Management Branch Director.

The NAHEMS Guidelines: Cleaning and Disinfection provides additional information on C&D Group Supervisor responsibilities.

15.3.2 Cleaning and Disinfection Team Leaders

C&D Team Leaders supervise the on-site activities of the C&D Team (or C&D teams, depending on the size and needs of the Infected or Contact Premises). C&D Team Leaders have responsibility for one of the specific C&D functions, such as the individual C&D stations or checkpoints. In a large incident, different C&D Team Leaders may manage the functions of vehicle disinfection stations, equipment, supplies on quarantined premises (which will include on-site coordination with the Biosecurity Team), and supervision of premises to be cleaned and disinfected.

Each C&D Team Leader supervises a C&D Team assigned to a clearly defined area or premises. Depending on the size of the response, there may be several C&D Teams, each with its own Team Leader. Two types of teams may be deployed:

- *C&D Strike Team.* A Strike Team has experience and technical knowledge in C&D techniques applicable to specific diseases. A Strike Team employs similar resources to execute disposal tasks on a specific premises or set of closely related premises.
- *C&D Task Force.* A Task Force has the skills and experience necessary to execute C&D tasks on a large complex premises or a diverse group of premises. This team has a wide

variety of resources and does not possess the technical knowledge in C&D techniques applicable to specific diseases.

The C&D Team Leaders (Strike Team or Task Force) should be identified well before an outbreak occurs. Team Leaders report to the C&D Group Supervisor.

The NAHEMS Guidelines: Cleaning and Disinfection provides additional information on C&D Team Leader responsibilities.

15.3.3 C&D Team Member

The number of C&D Team members will depend on the characteristics of the premises (number of buildings, size and separation of buildings, size of the area, sanitary conditions of the premises, and the time frame with which work can or must be completed). The work of the C&D Team on an Infected or Contact Premises is essential for containing and controlling a disease outbreak. The C&D Group Leader assigns personnel to C&D teams, identifies a C&D Team Manager, and assigns these individuals to Infected or Contact Premises as soon as possible.

The C&D Team consists of individuals who are experienced and skilled in C&D procedures and familiar with handling cleansers and disinfectants. The Teams visit their assigned premises to implement C&D processes to impede the spread of pathogenic microorganisms. Multiple teams may be assigned to a single premises. Personnel serving on a C&D Team may be drawn from a number of sources. USDA APHIS and State cooperators have Animal Health Technicians with the training and experience to supervise C&D and handle and apply C&D agents. Local pest control companies have experience in working with the spray equipment and pressure pumps commonly used in C&D. In the agricultural community, there are businesses that specialize in C&D of facilities. Members of the military from the Department of Defense may be available through memorandums of understanding between departments. Local hires can be trained for specific application activities.

The NAHEMS Guidelines: Cleaning and Disinfection provides additional information on C&D Team member responsibilities.

15.4 Procedures

Before beginning any C&D procedure, the C&D Group Leader, in consultation with the C&D Group Supervisor, needs to carefully assess the situation and plan the C&D response accordingly to ensure a well-coordinated approach. Proper planning helps to ensure the elimination or reduction of pathogens, prevents further movement of pathogens, and helps to ensure the safety of response personnel, animals, and the environment. It also minimizes the possibility that a lack of resources impedes the C&D process.

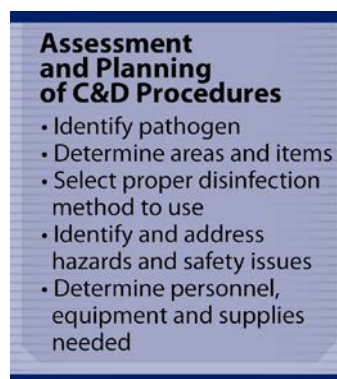
15.4.1 Assessment

In the assessment phase, information is gathered to assist with the planning of the C&D response. It includes the following (see Figure 15-3):

1. Identifying the FAD to be controlled or eliminated.

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2. Meeting with the premises owner to
 - a. conduct a property assessment (location of electricity poles and lines, underground cables, phone lines, fuse box, and meter),
 - b. determine areas and items requiring C&D,
 - c. identify areas requiring specific decontamination action,
 - d. identify any potentially hazardous situations, and
 - e. identify the location of drainages and run off destinations.
 3. Estimating the time frame needed to address the situations.

Figure 15-3. Assessment and Planning of C&D Procedures



Source: Andrew Kingsbury, Iowa State University.

15.4.2 Planning—Site-Specific C&D Plan

Information gathered during the assessment phase helps the C&D Group Supervisor to effectively plan the response and ensure the safe handling of chemical compounds. The C&D Group Supervisor or designee—in consultation with the owner or the owner’s agent and other officials—prepares a site-specific C&D plan. The C&D Group Supervisor, along with the Disease Management Director, must approve the plan before implementation.

15.4.2.1 Outline

Provide a written plan detailing how C&D is performed at a given site. The plan should include the following:

- A review, design, and setup of the premises.
- Definition of the area to be cleaned and disinfected.
- Identification of appropriate locations for the C&D setup and process, and holding areas for
 - vehicles and heavy equipment,
 - personnel, and
 - small equipment.

-
- Selection of EPA approved C&D products to be used.
 - Description of proper C&D methods and processes to include
 - cleaning,
 - washing (pre-soaking, scrubbing, rinsing, and drying),
 - disinfecting, and
 - downtime.
 - Personnel requirements and assignments.
 - Materials, supplies, and equipment.
 - Regulatory permits and approvals.
 - Plans for proper disposal of disinfectants and materials. (See the NAEHMS Guidelines: Disposal and the Disposal SOP).
 - Quality Assurance and Quality Control.

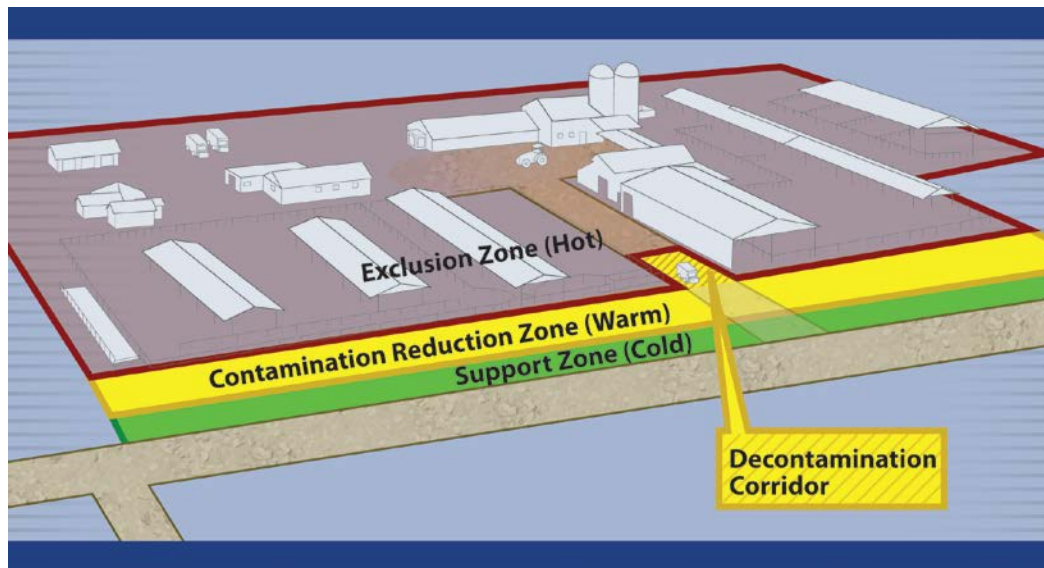
15.4.2.2 Review, Design, and Setup of the Premises in the C&D Plan

During the assessment phase, gather sufficient information to design and setup the premises for C&D. This part of the plan should include:

1. Selecting the most appropriate sites to conduct disinfection and decontamination for equipment and personnel. (See the NAEHMS Guidelines: Cleaning and Disinfection for the requirements for selecting disinfection and decontamination sites). The chosen location should
 - a. have minimal environmental impact, and
 - b. have adequate drainage to a holding tank.
2. Determining areas on the premises that need C&D. Consider the following, for example, when defining the C&D area:
 - a. Interior and exterior surfaces that need C&D.
 - b. Other structures or items such as fences that need C&D.
 - c. Potential environmental risks for outdoor disinfection.
3. Designing and setting up the different stations, to include the following:
 - a. Holding areas, Hot Zone/Exclusion Zone (EZ), Warm Zone/Containment Reduction Zone (CRZ), and Cold Zone/Support Zone (SZ) for heavy equipment/machinery.
 - b. Holding areas, Hot Zone/EZ, Warm Zone/CRZ, and Cold Zone/SZ for small equipment and tools.
 - c. Hot Zone/EZ, Warm Zone/CRZ, and Cold Zone/SZ for personnel wash stations (see Figure 15-4).
 - d. Adequate privacy for personnel cleaning stations.

- e. Placement of drainage pits, if needed, that are located away from sensitive environmental areas, such as wetlands or wellhead areas.
- f. Areas for the placement of items for off-site disposal that require further processing such as decontamination and then transport to off-site facilities.
- g. Placement of items for on-site disposal.

Figure 15-4. Biosecurity Control Zones



Source: Dani Ausen and Andrew Kingsbury, Iowa State University.

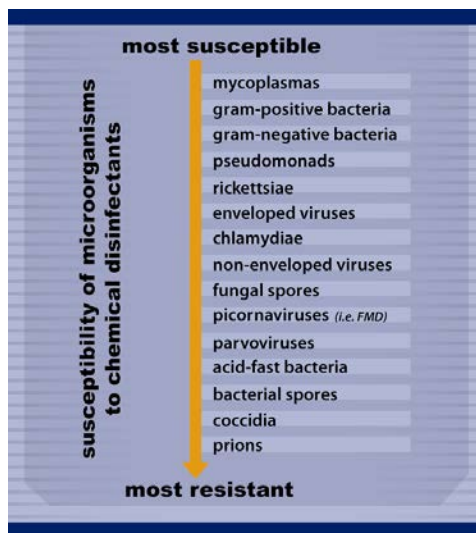
15.4.2.3 Selection of Proper Disinfectants and Methods in the C&D Plan

The requirements of the incident, specifically, the microorganism of concern, disinfection methods, and environmental factors all contribute to the disinfectant selection and C&D methods. USDA APHIS recommends that the selection of the disinfectant and disinfection methodology should be based on EPA-registered labels for antimicrobial pesticides (that is, disinfectants). The label will be registered by the EPA either under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 3 (regular label) or under FIFRA Section 18 (emergency use label). The disinfectant is used according to its registered label at the indicated dilution, use sites, application method, contact time, and cautionary statement against the pathogens specified on the label.

In addition, a registered disinfectant may be used according to label indication against pathogens not listed on the label (under a FIFRA Section 2(ee) exemption) provided that this use is not in conflict with State or local policy. The non-label-listed pathogens should be equally or more sensitive to inactivation by the disinfectant than the heartiest pathogen listed on the registered label. The NAHEMS Guidelines: Cleaning and Disinfection guidance includes recommendations gleaned from the literature and generally accepted disinfection practices. APHIS VS Emergency Management staff must collaborate with the APHIS Policy and Program Development (PPD) Environmental and Risk Analysis Services (ERAS) staff and EPA's Office of Pesticide Programs for the correct disinfectant selection and application.

Document, in the site-specific plan, the scientific rationale for instituting particular C&D parameters for a specific disease. (Figure 15-5 displays the susceptibility of different types of microorganisms to chemical disinfectants.)

Figure 15-5. Susceptibility of Microorganisms to Chemical Disinfectants



Source: Clint May and Andrew Kingsbury, Iowa State University.

The site-specific plan must document the following:

- Identify the disinfectant to be used.³
- Specify the cleanliness and effectiveness to be achieved.
- Identify the surfaces and structures to undergo C&D.

If a non-EPA-registered disinfectant is determined to be the most effective, the C&D Supervisor, Disease Management Branch Director and Operations Section Chief, or other Animal Health Official, must seek approval to use the non-EPA-registered disinfectant (see the EPA website on seeking exemptions at: <http://www.epa.gov/oppr001/section18/>. Subsection 15.4.2.11, Regulatory Permits and Approvals, describes the process for obtaining permits for using a non-EPA-registered disinfectant. Recently, the EPA approved the use of citric acid disinfection treatments for porous and nonporous food and non-food contact surfaces that are at risk of contamination by foot-and-mouth disease virus or African swine fever virus.⁴

The plan must also cover the various C&D methods that apply to the specific site. (See the NAHEMS Guidelines: Cleaning and Disinfection for guidance on choosing a C&D method and on using the appropriate disinfectant.) C&D methods may include

- steam cleaning, pressure washing, or scrubbing by hand;

³ A list of EPA-approved pesticides can be found at: http://www.aphis.usda.gov/animal_health/emergency_management/disinfectants.shtml.

⁴ US EPA. 2013. Citric Acid Section 18 Authorization Amendment. Available at http://www.aphis.usda.gov/animal_health/emergency_management/downloads/exempt_authorization.pdf.

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- shoveling, vacuuming, or sweeping out bulk materials;
 - the chemical disinfectant to be used and its application (as a gas, liquid, foam, or powder) and whether those materials will be sprayed on; and
 - physical (heat, ultraviolet light, or desiccation).

15.4.2.4 Personnel Requirements in the C&D Plan

Assessing the premises provides an understanding of the size and complexity of the C&D effort. The number and expertise of the personnel required to conduct C&D depends on the quantity and size of the areas and buildings, the sanitary condition of the premises, and time frame the work is to be performed. The personnel components of the C&D plan must include the following:

1. An estimate of the required number of C&D teams based on the size and scope of the job.
2. Identification of C&D Group members to fill the teams. Use 3D contractors if necessary to fill positions.
3. Identification of specific briefings required before C&D activities, including safety requirements, site conditions, and specific tasks.
4. A determination of briefing frequency.
5. Training and credentialing requirements for C&D Group members and the verification of credentials, training, and security clearances. A summary of available training can be found in [Attachment 15.A](#).
 - a. If necessary, the C&D Group Supervisor arranges to provide personnel with just-in-time training.
 - b. All personnel must be trained on basic C&D procedures, safety protocols, and briefed on the specific aspects of the incident. No one will be allowed to enter premises without verified credentials.
 - c. Include training on the safe handling of chemical compounds.
 - d. Discuss means of addressing and mitigating potentially hazardous situations noted during the pre-assessment phase.
6. The specific tasks for which a C&D Group member is responsible.

15.4.2.5 C&D Equipment and Supplies in the C&D Plan

Equipment needs will vary according to the specific situation. The C&D Team Leader assesses the premises to help identify the specific equipment that is necessary. See [Attachment 15.B](#) for a list of basic C&D equipment and supplies. The C&D equipment and supplies component in the C&D plan must include the following:

1. Specify the materials, supplies, and equipment necessary to perform the C&D methods recommended in the plan.

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2. Identify general equipment and supplies needed for C&D. They are as follows (see the site-specific C&D plan for specific requirements):
 - a. *Steam cleaning.* Steam-cleaning equipment, water, a generator, and fuel.
 - b. *Autoclave.* Fuel, or generator, and autoclaving bags.
 - c. *Pressure washing.* Pressure-washing equipment, water, a generator, fuel, detergent, mops, pumps, a collection system, and buckets.
 - d. *Scrubbing.* Brushes, extension handles, nonslip stepladders, detergent, water, mops, pumps, a collection system, and buckets.
 - e. *Vacuuming.* A vacuum, bags, filters, a generator, and fuel.
 - f. *Brushing.* Brooms, brushes, dustpans and shovels, bags, and dust control.
 - g. *Demolition.* Pry bars, heavy equipment, rollofs, liners, dust control, and trash bags.
 - h. *Chemical disinfection.* EPA-registered or exempted disinfectants, mixing apparatus, test strips to measure strength, dispensing equipment, containment system for preventing environmental release of concentrated disinfectants, safety cabinets, tarps, sandbags or booms, pumps, containers, and other equipment required for collecting and properly disposing of used disinfectant solution.
 - i. *Berming materials.* 4x4s, sand tubes, and sand bags.⁵
 - j. *Other equipment.* Plastic sheeting (> 2 millimeters thick), long-handled scrubbing brushes, sponges, buckets, towels, heavy-duty plastic garbage bags, framing materials, sump pump, power supply, and drums.⁶
 3. Identify means for acquiring difficult-to-obtain equipment.
 4. Determine the supplies and equipment that may require special permitting.
 5. Identify means for obtaining the special permitting.

15.4.2.6 Considerations

The site-specific C&D plan also should address the following:

- A protocol for disinfecting common types of structures, pens, and equipment found in typical commercial operations.
- Influences of natural processes (time, sunlight, temperature, and dehydration) in the decontamination process.
- A process to certify and record that the premises, vehicles, and heavy and small equipment have been successfully cleaned and disinfected or pose a low enough risk not to require active C&D.
- Describe how to handle damage to private property due to C&D activities.

⁵ “Cleaning and Disinfection: Standard Operating Guide No. 004” (October 2008). Missouri Department of Agricultural Emergency Response Actions: Livestock Disease Emergency.

⁶ “Cleaning and Disinfection: Standard Operating Guide No. 004” (October 2008). Missouri Department of Agricultural Emergency Response Actions: Livestock Disease Emergency.

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- Provide details on how to dispose of material (organic and inorganic) that minimizes the further spread of microorganisms and that is compliant with Federal, State, and local requirements and policies. (See the Disposal SOP).
 - Provide a process for documenting, recording, and appraising items that are difficult to clean or of limited financial value. See Title 9 Code of Federal Regulations (CFR) Section 53.3.

15.4.2.7 Regulatory Permits and Approvals

The site-specific C&D plan should specify the approvals needed to perform C&D activities, for example:

- EPA exemption for emergency use of an unregistered pesticide or of a registered pesticide for a use not listed on the label, if applicable.
- Licensing of disinfectant applicators, if required.
- Testing and approval of C&D solutions before discharging them to the environment, as applicable (for example, testing the strength of a bleach solution using a Hach test kit).
- The test parameters and standards must meet.
- Other approvals, such as environmental permits.

15.4.2.8 Disposal of Pesticides

The C&D site-specific plan must include processes for disposing any unused disinfectants (See the Disposal SOP). Ideally, C&D personnel will minimize mixing excess disinfectants. Consult the manufacturer's instructions, the proper methods of handling pesticide waste, and processes for determining the appropriate Federal and State-specific waste codes.

15.4.2.9 Quality Assurance/Quality Control

The plan should outline all quality assurance/quality control metrics, including the post C&D evaluation and inspections necessary to comply with the plan; for example, ensure that

- all surfaces are cleaned before they are disinfected, and
- required disinfectant concentrations and contact times are achieved, and sufficient quantitative verification tests confirm disinfection, if applicable.

15.4.2.10 Personnel

The C&D Group Supervisor works with the Disease Management Branch Director and Operations Section Chief to identify C&D personnel with the required expertise (as identified in the site-specific C&D plan). The C&D Group Supervisor advises the Disease Management Branch Director and the Operations Section Chief of any personnel requirements that cannot be satisfied locally so that additional personnel can be assigned. This individual also works with the appropriate officials to issue contracts and leases for equipment, supplies, or personnel for C&D operations.

If appropriate personnel are not readily available, contact the USDA APHIS VS NVS for access to 3D contractors.

15.4.2.11 Regulatory Permits and Approvals

The C&D Group Supervisor obtains the following permits and approvals:

- A list of disinfectants that will be used. They must be on the approved EPA list.⁷
- If the chosen disinfectant is not on the approved EPA list, seek an exemption from the EPA for emergency use of an unregistered pesticide or the use of a registered pesticide which is not listed on the label, as follows:⁸
 - USDA APHIS VS Emergency Management staff collaborates with the APHIS Program and Policy Development Environmental and Risk Analysis Service (PPD ERAS) staff to obtain exemptions from the EPA, either in advance of or immediately after an outbreak has occurred, as needed. PPD ERAS serves as the primary liaison with the EPA on all administrative matters pertaining to exemption registrations, renewals, amendments, and reporting.
 - The EPA determines if an emergency condition exists.
 - If granted, the EPA determines the time limit (15 days in a crisis situation) that the non-EPA-registered disinfectant may be used, and the EPA provides details on the parameters of the exemption.
- Testing and approval of C&D solutions before discharging them to the environment.
- Environmental permits.

15.4.2.12 Briefings

The C&D Group Supervisor briefs C&D Group members on all aspects of the C&D effort, including their duties, policies, and procedures. The C&D Group Supervisor prepares briefings and reports for the Operations Section Chief and notifies him or her immediately of any problems.

Other briefings include the following:

- The Site Safety Officer briefs all responders on safety precautions for each operation in accordance with the site-specific health and safety plan. (See the Health and Safety and PPE SOP and the NAEHMS Guidelines: Health and Safety section on Safety Issues and Precautions.)
- The Biosecurity Officer briefs all responders on biosecurity protocols before entering the EZ.
- C&D Group members are briefed on the nature of the disease and any other circumstances that might affect the response.

⁷ See <http://www.epa.gov/oppad001/chemregindex.htm>.

⁸ Section 18 of FIFRA authorizes EPA to grant temporary exemption to APHIS or sites to use unregistered pesticide for a limited time, if EPA determines that emergency conditions exist.

15.4.2.13 Site Security and Safety

All personnel entering the site must do the following:

- Meet security requirements as established by the IC.
- Present documentation of verified credentials showing they are qualified to perform their assigned tasks.
- Present documentation that they have received all required briefings as defined in the site-specific C&D plan.
- Wear required PPE as specified in the site-specific health and safety plan. (See the Biosecurity and the Health and Safety and PPE SOPs and Biosecurity, Health and Safety, and PPE NAHEMS Guidelines). All employees must follow Good Manufacturing Practices, Good Agricultural Practices, and the personnel hygiene and safety program that their company has established relating to PPE, biosecurity, and C&D protocols.
- Be familiar and appropriately prepared to prevent the various chemical and physical hazards associated with the C&D of premises. (See the NAHEMS Guidelines: Cleaning and Disinfection.)

15.4.2.14 Materials, Supplies, and Equipment

The Logistics Section provides transportation, food and water, and lodging for the C&D Group as specified in the incident-specific operations plan. Logistics also provides the required equipment such as materials, detergents, and disinfectants identified by the C&D Group Leader. From the list of required C&D materials, supplies, and equipment in the site-specific C&D plan, the C&D Group Supervisor identifies what is already available on site and orders unavailable items through the Logistics Section.

15.4.2.15 Cleaning and Disinfection

The material composition (for example, concrete and metal) of an item that requires C&D can impact the type of methods that should be used. (See NAHEMS Guidelines: C&D for more information on the considerations and contraindications.)

The specific processes for C&D vary by the item to be cleaned and disinfected and are described below. This SOP includes item-specific C&D processes such as:

- Respirators ([Attachment 15.C](#))
- Personal decontamination and outerwear and footwear ([Attachment 15.D](#))
- Premises ([Attachment 15.E](#))
- Slurry Pits ([Attachment 15.F](#))
- Biohazardous materials ([Attachment 15.G](#))
- Vehicles and heavy machinery ([Attachment 15.H](#))
 - Cart and pullet truck
 - Spent hen truck and trailer

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- Shell egg truck exterior and interior
 - Tanker exterior wash procedures
 - Equipment ([Attachment 15.I](#))
 - Egg handling materials ([Attachment 15.J](#))
 - Tankers, lines, and silos ([Attachment 15.K](#))
 - World Organization for Animal Health (OIE) standards for processing milk to destroy the Foot-and-Mouth Disease (FMD) virus ([Attachment 15.L](#))
 - Animal by-products ([Attachment 15.M](#)).

For general C&D, the following steps must be taken:

1. Wear adequate PPE as described in the site-specific health and safety plan during all steps of C&D. (See the Biosecurity and Health and Safety/PPE SOPs.) Personnel operating high pressure washers should use protective rubber outfits (boots, coats, pants, hats, mask, and gloves).
2. Consult with the Vector Control Group on insect and vector control plans. Consult with the Disposal Group on the proper disposal of dead rodents and other vermin.
 - a. Remove feed from all feeders and place in the area designated in the site-specific plan for biohazardous materials requiring appropriate disposal.
 - b. After all feed has been removed, place rodenticide along established runways.
 - c. Use insecticides on the inside and outside perimeters of the building.
 - d. Remove dead insects and rodents and dispose of according to the site-specific disposal plan. (See the Disposal SOP.)
 - e. Apply insect and rodent control products as soon as the animals are removed.
 - f. Eliminate openings where wild animals and rodents can enter the building.
3. Disconnect utility supplies if described in the plan.
4. Control ventilation to maintain human comfort and prevent pathogen dispersion.
5. Seal drains.
6. Empty all watering and feeding apparatuses, disassembling if appropriate, to facilitate C&D.
7. Follow the Dry Cleaning, Washing, Rinsing and Drying, Disinfecting, and Downtime section of the document (Subsections [15.4.2.15.1](#) to [15.4.2.15.7](#)).
8. If the facility is fumigated, make the facility airtight after the cleaning and washing steps.

15.4.2.15.1 Dry Cleaning

Dry cleaning involves the removal of any gross contamination and organic material (for example, soil, manure, bedding, and feed) from production areas or equipment.

Take the following steps for cleaning:

1. Obtain appropriate equipment for dry cleaning such as shovels, manure forks, brooms, and brushes. Heavy equipment such as bobcats or tractors may be needed to move larger quantities of debris such as manure and bedding. Figure 15-6 shows a skidloader removing organic material from a barn.

Figure 15-6. Heavy Equipment for Dry Cleaning



Source: Danelle Bickett-Weddle, Iowa State University.

2. Move large debris (manure and bedding) to the location specified in the site-specific plan. Collect and evaluate the small debris to determine whether to dispose or to clean and disinfect. Move small debris for disposal to the location specified in the site-specific plan. (See the Disposal SOP.)
3. If dry cleaning the inside of a structure, turn off all fans, air filters, and close off ventilation systems to avoid spreading pathogens.
4. Spray all surfaces and areas to be cleaned with a light mist of water or disinfectant solution to control excessive dust and minimize aerosolization of pathogens.
5. Scrape the contaminated area manually using a shovel or brush or mechanically using a loader to remove coarse, loose material.
6. Sweep or vacuum the scraped area to remove finer particles. Do not use leaf blowers under any circumstances, because they can disperse pathogens and spread disease.
7. Containerize and dispose of all dry material and debris in accordance with the site-specific plan.

15.4.2.15.2 Washing

Following the removal of gross contamination (dry cleaning), areas or items should be washed with detergent. The washing process helps to further reduce the number of microorganisms and

to remove any oil, grease, or exudates that may inhibit the action of disinfection. Washing prior to disinfection is one of the most commonly overlooked steps in the C&D process.

Take the following steps for washing:

1. Obtain alternate power supplies if all electrical power will be shut off for washing.
2. Turn off, unplug, and remove or tightly cover any electrical equipment with plastic sheeting. Contact an electrician if necessary.
3. If necessary, use brushes to scrub all contaminated surfaces with water and detergent in accordance with the site-specific plan, ensuring that cleaned areas are free of dirt and debris. Warm water can aid in removing organic debris. Caked-on materials may require prolonged soaking time.
4. High-pressure water and detergent may be effective in removing accumulation of urine and feces. Make sure proper PPE is worn to protect against the aerosol resulting from the high-pressure wash.
5. Use warm to hot water (90–130°F [32–54°C] or higher).
6. Flush, sanitize, and drain all components of the watering and feeding systems. If possible, remove and disassemble these devices to remove organic debris and permit proper cleaning. Flush, sanitize, and drain reservoirs.
7. For ventilation components, individually clean fans, casings, motors, belts, curtains, ventilation pads, and louvers, ensuring they are free of manure, debris, dust, and dirt before disinfection. Individually wipe, clean, and sanitize equipment such as thermostats, scales, time clocks, electrical panels, switches, and light bulbs and protect them as needed from the more severe methods of cleaning (such as high-pressure sprayers) and recontamination during the cleaning process.
8. Dispose of all C&D solutions in accordance with the site-specific disposal plan.

15.4.2.15.3 Rinsing and Drying

After washing, all surfaces should be thoroughly rinsed, as residues from cleaners and detergent can inactivate certain chemical disinfectants.

Take the following steps for rinsing and drying:

1. Use clean, cold water that is under low pressure to rinse all contaminated surfaces with to remove any remaining dirt, debris, and residue. This is necessary to remove any soap or detergent residue, which if present may inactivate several chemical disinfectants.
2. Visually inspect the surface for cleanliness; there should be no “beading”. Instead, the water should spread evenly over the surface. All surfaces should be free of all foreign matter.
3. Dispose of the rinse water in accordance with the site-specific plan.
4. Allow sufficient drying time (overnight) so no free liquids remain on the washed surfaces.

15.4.2.15.4 Disinfection Method Selection

This SOP specifically focuses on chemical disinfection methods. See the NAHEMS Guidelines: C&D for more detailed information on the different methods of disinfection (physical, soap and detergents, and chemical).

1. Calculate the total surface area of the floor, ceiling, and walls. Use a minimum of 0.4 liter of disinfectant for every square meter.
2. Select the appropriate chemical disinfectant (see the NAHEMS Guidelines: C&D on different types of chemical disinfectants) as specified in the site-specific plan.

15.4.2.15.5 General Disinfectant Mixing Protocol⁹

The proper mixing of disinfectant is critical to achieving the right concentration for effective disinfection and the health and safety of C&D personnel. This section describes a general disinfectant mixing protocol. ([Attachment 15.N](#) provides a sample disinfectant mixing protocol for Virkon® S):

1. Wear appropriate PPE when opening and mixing disinfectants. At minimum, wear disposable outwear (for example, coveralls, boots, hat, and gloves).
2. Ensure that the chemical disinfectant has been stored properly (a cool location is necessary to maximize shelf life) and is within the maximum shelf life before mixing. Check the product label for the expiration date.¹⁰ If there are concerns about the chemical's effectiveness, use a test kit. Test kits can help determine whether any chemical degradation of the disinfectant's active ingredients has occurred. Some chemical disinfectants come equipped with test kits (Figure 15-7).

Figure 15-7. Test Kits



Source: Teresa Robinson, USDA.

⁹ See Attachment 15.Q for specific protocol on mixing the disinfectant Virkon® S.

¹⁰ The shelf life of a disinfectant is not always noted on the label. In such situations, use test kits as described in the body.

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3. Calculate the required amount of disinfectant. For liquid chemical disinfectant solution, calculate the total surface area of the floor, walls, ceiling, and fixed equipment requiring treatment. In general, one gallon of diluted disinfectant usually covers approximately 100–150 sq. ft. of surface area. Use test-kits to ensure that the diluted solution contains the necessary amount of active ingredient.
 4. Ensure that the correct proportion of disinfectant concentrate is added to the correct volume of water.
 5. Mix the required amount of disinfectant solution in accordance with label instructions or FIFRA Section 18 exemption criteria. Always add concentrate to water, not water to concentrate.
 6. In cold temperatures, heat the building to 68°F (20°C) if possible.
 7. Once a solution has been prepared, it must be used on the same day or it may become inactive. If there are concerns about the chemical's effectiveness, test kits can help to determine whether any chemical degradation of the disinfectant's active ingredients has occurred.

Maintaining a daily log of the prepared solution is critical in minimizing excess solution preparation and maintaining the efficacy of the disinfectant (See [Attachment 15.O](#) for a sample Virkon® S—Mix Report Daily Log).

15.4.2.15.6 Disinfection

Apply disinfectant in a pre-cleaned facility from top to bottom and from back to front. The time a disinfectant is in contact with the surface is important and varies with the type of disinfectant. Carefully follow the specific instructions on the disinfectant label. Reapplication of disinfectant may be necessary to achieve the product label-indicated contact time.

Take the following steps for general disinfection:

1. Apply the disinfectant to the contaminated surfaces in accordance with the site-specific plan and product label.
2. Ensure that the disinfectant has had adequate contact time as specified on the disinfectant label. Note that the recommended contact time will vary by the type of surface being treated, and reapplication of disinfectant may be necessary to achieve the product label-indicated contact time. (See the NAHEMS Guidelines: C&D on Material Composition for more information.)
3. Ensure that any unused disinfectant concentrate and solution are either stored in accordance with the label instructions and the site-specific health and safety plan or properly disposed.

As previously mentioned, most items found in animal production situations (for example, wood, insulation, feed, and bedding) cannot be properly cleaned and disinfected. To disinfect these materials, the literature recommends spraying with a disinfectant for the appropriate contact time, and then disposing. Consult the literature for the most practicable methods for the C&D of these items. Items identified for disposal must be disposed according to the disposal plan. (See the NAHEMS Guidelines: Disposal and Disposal SOP).

15.4.2.15.7 Downtime

In accordance with response plans and to verify that C&D is complete, the premises must have had adequate downtime and test negative before repopulation; most disinfectants may be harmful to animals.

Take the following steps for downtime:

1. As soon as the premises has been certified as clean and disinfected, downtime may begin.
2. Allow the area to completely dry. It must be free of any animals or activity for a length of time that is at least three times the longest expected incubation time of the pathogen to allow it to completely dry.
3. Cordon off the area with marking tape.

15.4.2.15.8 Disposal

C&D personnel coordinate with the Disposal Group on the proper way to dispose of disinfectant solutions and other waste items resulting from the C&D process and from C&D supplies to bedding, feed, and manure (See the NAHEMS Guidelines: Disposal and Disposal SOP):

1. Remove potentially corrosive disinfectant solutions.
2. Clean pressure sprayers and pumps.
3. Treat C&D supplies (for example, towels and mops) as small debris or properly disinfect them before removal from premises.

15.4.2.15.9 Post C&D

After C&D processes have been completed, the premises and the equipment all must be evaluated to ensure that the processes have been completed properly. In addition to the physical inspection, the premises must be evaluated to ensure complete disinfection. One option to ensure complete disinfection is to either restock with sentinel animals (see Subsection 15.4.2.15.11) or to exercise environmental testing.

15.4.2.15.10 Evaluating the Premises

Following the C&D of premises and equipment, the C&D Group Supervisor and Disease Management Branch Director review and evaluate that C&D has been completed successfully. The evaluation assesses and confirms that the following have taken place:

- All grossly contaminated areas have been identified and properly cleaned and disinfected with an appropriate disinfectant.
- All personnel are aware of C&D measures and implement them for themselves and their equipment (for example, PPE, tools, and instruments).
- Gross debris (for example, manure, unused feed, or bedding) have been removed, sprayed with disinfectant, and properly disposed.
- Any contaminated wood or items difficult to disinfect have been appraised, removed, and disposed of in a manner that minimizes spread of pathogens (for example, burned, composted, or buried).

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- All fixtures and fittings have been dismantled, cleaned, and disinfected.
 - All infected or suspected areas have been properly washed, rinsed, and disinfected; visual inspection should be conducted to ensure surfaces are clean and no organic material has been left behind.
 - An EPA-registered or exempted disinfectant that is effective against the target microorganism was used at the appropriate concentration.
 - The necessary contact time of the disinfectant was permitted.
 - Effluent from the C&D procedures has been handled in a manner to minimize or avoid environmental impact.
 - All fluids have been properly disinfected and allowed to dissipate before release.
 - Final inspection of the premises should be conducted by an experienced officer. Ideally, this should be an individual who was not previously involved in any earlier inspections. All personnel should proceed through the C&D site before leaving the premises.
 - If there is any doubt or sign of inadequate procedures, the disinfection measures must be repeated.
 - Restock the area.

15.5 Additional Resources

The following are additional resources:

- USDA APHIS Disinfectants-http://www.aphis.usda.gov/animal_health/emergency_management/disinfectants.shtml.
- Selected EPA-registered disinfectants-<http://www.epa.gov/oppad001/chemregindex.htm>.
- Iowa State University Just-In-Time C&D Training-<http://www.cfsph.iastate.edu/Emergency-Response/Just-in-Time/05-Cleaning-and-Disinfection-Premises-JIT-PPT-6slide-HANDOUT.pdf>.
- Purdue University-<http://www.biosecuritycenter.org/>.
- Missouri Department of Agriculture Agricultural Emergency Response Actions—Livestock Disease Emergency C&D SOP-http://mda.mo.gov/animals/pdf/animalag_guide4.pdf.

Attachment 15.A Training

All personnel involved in C&D must be properly trained on the latest C&D techniques.

For training in pesticides usage, see the Ohio State University Extension course “[Pesticide Safety Education Program](#).” It offers an online course that focuses on pesticide labeling, pest management, pesticide formulations, pesticide hazards and first aid lessons, PPE, pesticides in the environment, pesticide transportation, storage and security, emergency response, planning the pesticide application, pesticide application and procedures, and Ohio and Federal laws and regulations. Courses can be purchased individually. See <http://pested.osu.edu/> for more information.

Purdue University’s Biosecurity Center Organization offers a Veterinary Homeland Security Graduate Certification Program. The class “[Biosecurity for Veterinary Responders](#)” discusses “Basic Principles of Cleaning and Disinfection.” See <http://www.biosecuritycenter.org/> for more information on the certificate program and course offerings.

Attachment 15.B Basic Cleaning and Disinfection Equipment and Supplies

The following is a list of C&D equipment and supplies for a crew of 10 persons.

Individual Equipment

(Each member's personal equipment)

1 pair	Coveralls—cloth
2 pair	Coveralls—disposable
1 each	Coat—waterproof
1 each	Pants—waterproof
1 each	Hat—waterproof
1 pair	Gloves—heavy gauntlet rubber
5 pair	Gloves—surgical rubber (for fine work if needed)
3 each	Masks—surgical (if needed)
1 each	Respirator (if needed)

Hand Tools

2 each	Claws hammer
2 each	Pliers
2 each	Screwdriver
2 each	Philips screwdriver
2 each	Crescent wrench (12 inch)
2 each	Crowbar
2 each	Hatchet
2 dozen	Wire brushes (with scraper nose) Fiber brushes (long handled)
6 each	Pails (12–14 quart)
2 dozen	Sponges
1 each	Tent (or other shelter)
2 each	Axe
2 each	Shovels (flat)
2 each	Fork (manure)
3 each	Brooms (heavy)
4 each	Hoes
2 each	Garden rakes
2 each	Scrapers (long handled) (for example ice scrapers or straighten hoes)
2 each	Post-hole digger
3 each	Hose (3/4 inch x 25 foot)
1 each	Shop vacuum
1 each	Electrical cord (12 gauge—100 ft)
	Flame gun (if needed)

Power Tools and Equipment

1 each	Power spray unit and tank
2 each	Spray nozzle
1 each	Safety can (5 gallon—with gas)
5 each	Hose (3.4 inch x 50 foot)

Miscellaneous

10 pair	Rubber gloves
4 each	Safety goggles
12 rolls	Marking tape
2 each	Plastic tub (10 gallon)
2 each	Metal cans (10 gallon)
2 each	Garbage can (galvanized—30 gallon)
4	Buckets (2 gal/7.5 L)
100 each	Plastic bag (8 mil—50 gallon)— for debris
50 each	Plastic bag (4 mil—30 gallon)— for clothes and miscellaneous
1 each	First Aid kit with eye wash
1 gallon per person	Bottled water (in pint or quart portions)
1 quart per person	Sports drink
1 per person	Soap (for personnel decontamination)
1 per person	Sponge or brush
	Alcohol free wipes
	Water source

Chemicals

1 gallon	Detergent (liquid) Virkon® S
	Bleach
100 lbs for 300 gallons working solution	Soda Ash (Sec. 18) (anhydrous sodium carbonate [Na ₂ CO ₃]) 4% w/v= 1 lb/3gallons water
50 lbs for 300 gallons working solution	Lye (Sec. 18) (sodium hydroxide [NaOH]) 2% w/v= 1 lb/6 gallons water) ¹¹
	Quaternary ammonia disinfectant
	Hypochlorite (1 oz [30ml] household bleach in 2 gal [7.5 L] water) solution
50ppm	Iodine, (0.8 ml of tincture of iodine to one liter of water at 110°F)
	Neutral detergent cleaning solution (excludes lanolin or oils)
	Test strips for disinfectant concentration
	Other suitable disinfectants

¹¹ USDA-APHIS has an exemption for use of this chemical to inactivate foreign animal disease agents.

Attachment 15.C Cleaning and Disinfecting Respirators

Respirators, if properly cleaned and disinfected, may be used as PPE again. Procedures for cleaning and disinfecting half and full respirators are detailed below. The procedures are based on Occupational Safety and Health Administration guidelines.¹²

Respirators must be cleaned after each use.

General Information

1. The process should always include these steps:
 - a. Cleaning
 - b. Sanitizing
 - c. Rinsing
 - d. Drying
 - e. Reassembly
 - f. Inspection prior to use.
2. If more than one respirator is cleaned at a time, group respirators together by manufacturer to avoid getting parts confused.
3. Respirators can be divided up into batches of 20. Water and cleaning fluids should be changed after 20 respirators are cleaned.
4. Disassembling and cleaning one respirator at a time is recommended.
5. Different respirator manufacturers market different cleaning and sanitizing solutions. Contact them for details regarding these products.

Procedures

1. Prepare 4 buckets (2 gal/7.5 L) of fresh warm water; follow sequence of use as described below.
2. Do not use boiling or hot water. Water temperature should be less than 110°F.
3. Disassemble respirator, remove cartridges and filters and any external accessories such as communications, hoods, head harness (if possible), and eye lens outserts. Do not remove the valves because they are easy to lose.
4. *Bucket 1.* Clean respirator (excluding cartridges and filters) with alcohol free wipes, or by immersing in a warm water cleaning solution, scrubbing with a soft brush or sponge. Do not brush eye lenses. Use a neutral detergent cleaning solution that does not contain lanolin or oils.

¹² http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9782.

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5. *Bucket 2.* Rinse in fresh, warm water. Running water is better than immersion if available. Thorough rinsing is important to keep detergents or disinfectants from drying on the respirator. (See Occupational Safety and Health Administration (OSHA) 29 CFR 1910.134, Appendix B-2, running water for rinsing [if available] is preferred over immersion).
 6. *Bucket 3.* Disinfect respirator by immersing in a disinfectant water solution. A quaternary ammonia disinfectant (per manufacturer's recommendation), a hypochlorite (1 oz [30ml] household bleach in 2 gal [7.5 L] water) solution, or an aqueous solution of iodine (50 ppm of iodine, made by adding 0.8 ml of tincture of iodine to one liter of water at 110°F) can be used. Chosen disinfectants must be EPA approved unless EPA has approved the exemption.
 7. *Bucket 4.* Rinse in fresh, warm water. Running water is better than immersion if available. Thorough rinsing is important to keep detergents or disinfectants from drying on the respirator. (See OSHA 29 CFR 1910.134, Appendix B-2, running water for rinsing (if available) is preferred over immersion).
 8. Replace cleaning solution, sanitizing solution, and rinse water after approximately 20 respirators have been sanitized, or as needed.
 9. Allow the respirator to air dry in a non-contaminated environment. Do not dry with heaters or in sunlight. Respirators can be reassembled before or after drying.
 10. Before re-use, conduct checks as recommended by the manufacturer's manual to assure that the system is ready to be placed in operation. It is very important to check that the inhalation and exhalation valves are in place before using.

Attachment 15.D Personal Decontamination and Cleaning and Disinfection of Outerwear and Footwear

Personnel engaged in C&D must use proper personal decontamination procedures before leaving an IP or any Quarantined Area.

Planning

1. Instruct all C&D personnel to bring a clean change of clothes and shoes with them to the site. The clothing must be placed in plastic bags and left at the entry point (Cold Zone-SZ).
2. Prepare buckets of soap and water for personnel decontamination that can be readily available for use throughout the operation.
3. Acquire necessary equipment such as heavy gauge plastic garbage bags for placing disposable PPEs.
4. Designate a site for personal decontamination that is near the exit point of IP. The site and setup should have adequate privacy (for example, tent, metal shed, or trailer with shower).
5. Identify means to contain run-off water, and do not allow it to drain into “clean” areas.

All outerwear, including footwear and industrial hats, must be removed to be cleaned and disinfected prior to exiting the premises or area. (See the Biosecurity and the Health and Safety and PPE SOPs and the Health and Safety and PPE NAEHMS Guidelines for more information.)

Hot Zone-EZ

1. Remove all outer garments.
2. Adhere to the following cleaning and washing procedures according to the item type:
 - a. If wearing disposable clothing (that is, overalls and gloves):
 - i. Remove all disposable clothing items.
 - ii. Place in disinfectant for the correct amount of time.
 - iii. Wring out.
 - iv. Place in plastic bags. Bags must be placed at the outer edge of the premises for disposal according to the disposal plan.
 - b. Reusable clothing:
 - i. From head to toe, use a sponge, brush, or low pressure spray to remove gross contaminants.
 - ii. Pay particular attention to creases, zippers, and collars.
 - iii. From head to toe, wash with warm water.

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- iv. Remove jackets and trousers.
 - v. Place all outerwear in disinfectant for the appropriate contact time.
 - c. Shoes
 - i. Use a sponge, brush, or low-pressure spray to remove gross contaminants.
 - ii. Pay particular attention to creases, zippers, and the soles.
 - iii. Remove shoes.
 - iv. Place all outerwear in disinfectant for the appropriate contact time.
 3. Remove items from disinfectant.
 4. Adhere to the following procedures depending on whether the C&D personnel will be returning to the site.
 - a. If the individual is not returning to the site:
 - i. After removing the items from the disinfectant, place these non-disposable clothing items in plastic bags.
 - ii. Place bags in outer perimeter to be picked up.
 - b. If the individual is returning to the site:
 - i. Hang items to dry.
 - ii. Keep the items on site for use the next day.
 5. Remove underclothing.
 6. Place underclothing in disinfectant for the appropriate minimum contact time.

Warm Zone-CRZ

Spray or wipe down the plastic bags with disinfectant and place at the outer limit of the area for collection for laundering where items will be washed in hot water and detergent before reuse.

1. Wash hair, body, and face with warm, soapy water.
2. Leave directly to the Cold Zone-SZ without re-exposure to contaminated areas.

Cold Zone-SZ

1. Obtain clean clothing and shoes that were left in the Cold Zone-SZ.
2. Leave the area.
3. Once home, take a long hot bath or shower with soap.

Attachment 15.E Cleaning and Disinfection for Premises

Preparation for C&D of Premises

1. Setup footbaths at all entrances and exits to the building.
2. Select an appropriate disinfection station for small equipment and personnel. (See the NAHEMS Guidelines: Cleaning and Disinfection and the Biosecurity SOP for criteria on selecting appropriate disinfection locations).
3. Select the appropriate disinfectant (see the [EPA-approved list](#)) as outlined in the site-specific plan.
4. Turn off all fans.
5. Disconnect electricity supply to the building.
6. Remove sensitive equipment.
7. Acquire an alternative electric supply as an electrical source for cleaning.
8. Ensure good lighting.
9. Trap and remove any vermin (for example, rodents, insects, or any other animals).
10. Remove any feed remaining in the pans, feed lines, chains, augers, or hoppers and place on the floor for removal with the litter.
11. Collect and remove all organic material and gross debris (for example, loose dirt, manure, and unused feed) and appropriately dispose of the materials. (See the Disposal SOP.)
12. Use a systematic procedure for C&D:
 - a. Always start at the back of the facility and proceed to the front.
 - b. Always begin application on the ceilings and move down the walls to the floor, then across the drain.
 - c. Use marking tape to clearly indicate where disinfection has and has not taken place.
13. Avoid creating pools of solution which could enter into drains.

C&D for the Premises Interior

1. Identify all drains and run offs.
2. Block and disinfect all drains and run offs.
3. Using a low-pressure sprayer, apply the chosen disinfectant to damp down the dust in the building and to prevent further spread of the pathogen.
4. Move any washable and removable equipment (for example, hand feeders, mangers, and grooming equipment) to the outside for C&D.
5. Other equipment that may require removal for C&D include thermostats, scales, time clocks, electrical panels, switches, and light bulbs.

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6. Remove rotten wooden fittings, posts, and flooring for burial or burning.
 7. Scrape windowsills and floors and other permanently attached equipment to remove any adherent organic material.
 8. Clean and disinfect ceilings, rafters, light fixtures, fan blades, and louvers and other structural components. Reapply disinfectant as needed to keep the surfaces wet for the required contact time.
 9. See the NAHEMS Guidelines: Cleaning and Disinfection on Materials Composition to apply the most appropriate C&D procedures depending on material composition.
 10. In accordance with State response plans, and to verify that C&D is complete, the premises must have had adequate downtime and be virus negative before repopulation; most disinfectants may be harmful to animals.
 11. Do not introduce animals for the length of at least 3 incubation periods after cleaning and disinfection procedures have been completed.

Cleaning and Disinfecting the Exterior of the Premises

1. Determine the width of the perimeter; it can be as wide as 10 feet around the premises' perimeter.
2. Seal areas where rodents or other vermin may enter the premises. All feral animals must be trapped or destroyed. (See the NAHEMS Guidelines: Cleaning and Disinfection.)
3. Roof areas and eaves with holes or nesting areas for wild birds must be addressed. (See the NAHEMS Guidelines: Wildlife Management and Vector Control for more information.)
4. If using a flame gun, ensure that there is no combustible material in the area. The flame gun can be used on outdoor concrete, brick, metal surfaces, or wet surface.
5. Use a low-pressure sprayer on ventilation and fan inlets.
6. Gather the cleaning and disinfecting equipment (for example, rakes, shovels, scrapers, brushes, trucks, spray/disinfection devices) and clean and disinfect these items (see [Attachment 15.B](#) for Cleaning and Disinfecting Equipment and Supplies). Reapply disinfectant as needed to keep the surfaces wet for the required contact time.

Attachment 15.F Disinfecting Slurry Pits

Slurry pits contain liquid manure (or slurry), a combination of feces, urine, fresh rainwater and runoff, cleaning materials, and bedding materials. Different methods of rendering pathogens inactive within a slurry pit exist; however, the most practicable in the event of an outbreak is the use of chemical processes.

Planning

1. Assess the capacity of the slurry pit.
2. Acquire mobile high-performance stirring equipment.

Guidelines

1. Exercise appropriate safety precautions. Consider the following:
 - a. Noxious fumes such as carbon monoxide, carbon dioxide, hydrogen sulphide, ammonia, and methane may be released with mixing.
 - b. Always have a minimum of two personnel engaged in mixing or preparing the tanks, never one person working alone.
 - c. The area must be well ventilated.
 - d. Personnel should wear respirators, safety harnesses, and a lifeline.
 - e. Slurry must not be less than 30 cm from the top of the tank.
 - f. Never trust the “crust” on top of a tank to take weight.
2. No fresh slurry must be added to slurry pits undergoing disinfection.
3. Store slurry for at least 60 days in the summer and 90 days in the winter before application on pasture.
4. Do not allow animals to graze for a minimum of 30 days after slurry application.

Procedures for Disinfecting Slurry Pits¹³

1. Examine the slurry pit and determine the amount of remaining space.
 - a. The slurry pit should not be at maximum capacity to allow for the addition of chemical products for disinfection.
 - b. If the slurry pit is at maximum capacity, dig an alternative pit and line with plastic sheeting. Pump the slurry into the new pit for treatment.
2. Vigorously stir the pit.
3. Add the chemical disinfectant.
 - a. The chemicals should alter the pH to less than 2.0 or to greater than 11.0.

¹³ Haas, B., Ahl, R., Bohm, R., & Strauch, D. (1995). Inactivation of viruses in liquid manure. Rev. sci. tech. Off. int. Epiz., 14(2), 435–445.

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- b. Ensure that the chemical disinfectant is properly distributed throughout the slurry pit.
 - c. Vigorously stir the chemicals in the pit for a minimum of 6 hours after application and on a daily basis for a minimum of 2 hours per day until the manure is considered safe.
 - d. Maintain at the required pH for a minimum of 7 days.

Attachment 15.G Disinfecting Biohazardous Material Prior to Disposal

Some biohazardous materials, such as sharps and unused vaccines, must be appropriately disinfected prior to disposal. This process is necessary to render an article safe for either reuse or disposal. The majority of biohazardous material is disinfected for the purposes of safe disposal and not reuse. Some biohazardous materials cannot achieve disinfection but only sanitization.

Treating these types of biohazardous materials can occur under these scenarios:

1. Professional biohazardous materials collection and processing is not available.
2. To limit the crossing of biosecurity lines under vaccination to kill scenarios, biohazardous materials must be disinfected on premises.
3. The site-specific disposal plan does not recommend or permit the thermal method for these biohazardous materials.

Planning

1. Determine whether the biohazardous materials, or which biohazardous materials, will be disposed on the premises or off site.
2. Obtain the required equipment to disinfect biohazardous materials such as
 - a. autoclaves and autoclave bags, and
 - b. PPE for operators.
3. Identify adequately trained personnel to operate the autoclave.
4. Check the equipment to ensure that it is properly operating.

Operations for Autoclaving

Autoclaving biohazardous materials is an adequate means of physical decontamination to render an article safe for disposal.¹⁴ The autoclaving process involves pressurized steam sterilization at 15 pounds per square inch (PSI) (1.05 kg/cm²), to achieve a chamber temperature of at least 121°C (250°F), which is effective at inactivating microorganisms. Procedures for autoclaving biohazardous materials are described below; however, an autoclave may not be readily available. **If autoclaving is not an option, the sharps container must be treated as a fomite and handled accordingly.**

¹⁴ Autoclaving also is appropriate for disinfecting materials for reuse. However, following a FAD outbreak, autoclaving will be used for decontaminating items prior to disposal.

Procedures

1. Retrieve the contaminated biohazardous materials at the autoclaving site. These items should have already been set aside in their proper locations by the Vaccination and the C&D Groups.
2. Carry the contaminated materials to the autoclave in closed, leak-proof containers (autoclave bags).
3. Place the autoclave bags in polypropylene or stainless steel pans.
4. Ensure that the autoclave bags are loosely closed. This is necessary to allow steam to penetrate into the bag to maximize the decontamination.
5. Add water to the material (250–500 ml) to facilitate heat transfer of the material being decontaminated only if doing so does not facilitate the release of potentially infectious material from the bag.
6. Load and start the process.
7. The process begins when the autoclave has reached 121°C (250°F) and 15 PSI.
 - a. 90 minutes are recommended for the decontamination of waste in low-sided polypropylene containers with bags half-filled and loosely gathered.
 - b. 120 minutes are recommended for tightly packed bags.
 - c. See Table 15.G-1 for EPA recommended processing times.
8. After the cycle is complete, allow the pressure in the autoclave chamber to return to zero.
9. Ensure the pressure in the autoclave chamber has returned to zero.
10. Slowly open the autoclave door (remain behind the door) and allow the steam to gradually escape.
11. Allow materials inside the autoclave to cool for 15–30 minutes.
12. Operator must don appropriate PPE.
13. Remove the item from the autoclave.
14. Place the now decontaminated bagged items in the Cold Zone-SZ for off-site disposal at a landfill. (See the Disposal SOP.)

Table 15.G-1. EPA Recommended Decontamination Processing Times¹⁵

Item	Time
Trash	60 minutes
Glassware (vaccine vials)	60 minutes
Liquids	60 minutes/gallon
Animal carcasses	8 hours
Animal bedding	8 hours

¹⁵ According to USDA Policies and Procedures on Biohazardous Waste Decontamination, Management, and Quality Controls at Laboratories and Technical Facilities, number 9630-00, June 2009.

Attachment 15.H Cleaning and Disinfecting Vehicles and Heavy Machinery

All vehicles (for example, cars, livestock carriers, feed trucks, milk trucks, and carcass transporters) and heavy machinery (for example, excavators, backhoes, and bulldozers) that have been used on IP must undergo proper C&D processes before departing the premises because of the potential to transport pathogens across premises. Aircraft and ships also may require proper C&D.

Poultry-specific vehicles include cart and pullet trucks, spent hen truck and trailer, shell egg trucks, and tankers.

Planning

1. Establish a large-scale disinfection station. (See the NAHEMS Guidelines: Cleaning and Disinfection on Site Selection for guidance on choosing the appropriate location.) The area should be two times as big as the largest vehicle to allow adequate workroom for C&D personnel.
2. Establish a holding area where disinfected vehicles can remain during the necessary disinfectant contact time.
3. Prepare berming materials (sandbags and straw bales) to contain spent fluids and debris from the vehicles that is large enough to withstand the weight of the vehicles and heavy equipment:
 - a. The area should be made at least twice as big as the largest vehicle to allow adequate working room for the C&D personnel.
 - b. Place plywood sheeting on top of the material or the construction of ramps to protect the berms at the entrances and exits.
 - c. Construct a framing wall around the containment base to contain the spray drift and splash.
4. Identify an area for a sump pit to collect spent fluids and debris:
 - a. Excavate a sump pit in the corner of the area.
 - b. The pit should be large enough to hold at least 10 to 20 gallons of liquid.
 - c. Line the pit with plastic sheeting to make it impermeable.
 - d. Use a layer of sand to aid the drainage of materials into the sump pit if it does not do so naturally.
 - e. Use a sump pump to direct spent fluids and debris into a holding tank.

General Procedures

1. Don appropriate PPE such as rubber gloves and eye protection.

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2. Remove the following items and set these items aside for C&D (See [Attachment 15.I](#) for cleaning and disinfecting equipment.):
 - a. Equipment in the truck bed or trailer, or in the vehicle's trunk.
 - b. Fixtures and fittings.

Cleaning Procedures

1. Dispose of soiled bedding and refuse.
2. Use shovels, manure forks, brushes, low-pressure sprayers, or mechanical scrapers to remove all visible organic material from the exterior of the vehicle. Remove any deposits of mud and straw from the wheels, wheel wells, tires, mudguards, and exposed chassis of the vehicle. It is essential that appropriate PPE be worn, especially when zoonotic disease agents are involved.

Washing Procedures

1. Use detergent and warm water (90°F–130°F) to wash the vehicle and removed items. Any deposits of mud and straw should be removed from the wheels, wheel wells, tires, mudguards, and exposed chassis of the vehicle.
2. Pre-soak items with debris that is difficult to remove with simple washing in detergent and warm water.
3. Rinse the vehicle in hot water. If that is not possible, allow the vehicle to sit for 5–10 minutes and allow the residual rinse water to drip off.

Exterior Disinfection

1. Select the appropriate disinfectant (See the U.S. [EPA-approved list](#)).
2. For vehicles and trailers, apply the disinfectant to the exterior of the vehicle, including the bodywork and wheels.
3. For trailers, apply the disinfectant to the outside of the trailer and the underside of the vehicle. Figure 15.H-1 depicts responders disinfecting farm equipment.
4. Spray all areas, including the wheels, wheel wells, tires, mudguards, and exposed chassis of the vehicle with a non-corrosive disinfectant.
5. Allow ample wet disinfectant contact time according to label directions with the vehicle or trailer, rinse, and allow to dry thoroughly.

Figure 15.H-1. Washing Heavy Machinery



Source: Tegwin Taylor, Iowa State University.

Interior Cleaning and Disinfection

Interior disinfection of the vehicle is necessary if the driver leaves the cab. If so, all surfaces on the interior of the cab will need to be disinfected.

1. Remove all non-fixed items from the vehicle to be cleaned and disinfected.
2. Sweep and brush away any debris or mud from the cab's interior.
3. Wash the floor mats and vehicle pedals and all other vehicle components that have had contact with passengers and/or the driver (for example, dashboard, steering wheel, handbrake, gear shift, and seats) with a detergent cleaner.
4. Rinse the floor mats and vehicle pedals with a clean rag and then wipe with a disinfectant-soaked cloth.
5. Wipe down the dashboard, steering wheel, handbrake, gear shifter, and seats with a registered antimicrobial product and allow ample wet contact time according to label directions before personnel re-enter the vehicle.
6. Remove the vehicle from the disinfection area to the holding area.
7. Wash the concrete surface with detergent.
8. Gather the C&D equipment (for example rakes, shovels, scrapers, brushes, trucks, manure spreaders, bucket loaders, and spray and disinfection devices) and clean and disinfect these items. Store in a secure location.
9. Allow the interior of the trailer to dry before returning cleaned and disinfected carts.

Vehicle Tracks

1. All vehicle tracks must be sprayed with a disinfectant. However, no environmentally safe procedures exist for “disinfecting” soil surfaces (for example, dirt, sand, and packed clay).
2. Spray along any of the tracks that may have been made.

Documentation

Document all actions taken on the sanitation report.

1. Driver must review the sanitation report for accuracy and completeness and inspect the sanitary conditions of all truck components before returning to pullet farm.
2. Driver must take a copy of the completed sanitation report with the truck when returning to the pullet farm.
3. When the truck arrives at the pullet/layer farm, the supervisor or designee must review the sanitation report and inspect the truck, writing any details on the form.
4. If any areas are found unacceptable, identify corrective actions that need to be taken to make areas acceptable. Note any corrective action taken on form.
5. The farm supervisor or designee at the next location that uses the equipment or vehicle signs the form verifying that everything was acceptable before the equipment or vehicle is allowed to be used at the farm.
6. Completed and signed forms are held at the premises.

Attachment 15.I Cleaning and Disinfecting Equipment

Some items may be difficult to clean and disinfect. Have these items appraised and then discard them.

Setup

1. Prepare the disinfectant. The disinfectant should be on the [EPA-approved list](#) of disinfectants.
2. Identify a disinfectant station for small equipment. The site should be near the entrance or exit points. The ideal site will be in proximity to a water supply and drainage.
3. Setup the C&D station on an impermeable surface (for example, plastic sheeting).

Procedures

Small Electronic Equipment

1. Dismantle if it is easily disassembled and reassembled.
2. Ensure that the selected disinfectant does not damage or corrode the equipment.
3. If the electrical equipment is airtight, it may be safely cleaned and disinfected by wiping it down with disinfectant or gently spraying with an appropriate disinfectant solution. The most practical method involves placing the equipment inside an airtight enclosure (for example, plastic sheeting) for fumigation.
4. If the small handheld equipment has been used inside a Quarantine Zone and has been protected inside a plastic bag
 - a. wipe down the protective plastic bags with disinfectant and discard,
 - b. wipe the body of the equipment with disinfectant, and
 - c. place equipment in a clean plastic bag for removal.

Other Small Equipment

1. Prepare tubs for submerging small equipment.
2. Use a scrub brush to dislodge encrusted material.
3. Apply disinfectant.
4. Allow appropriate contact time.
5. Move items to the next staging area.
6. Apply disinfectant a second time if necessary. The disinfectant must not dry during the specified contact period but rather must remain “wet” on the item to be efficacious.
7. Allow appropriate contact time before air drying.

Equipment Used to Euthanize Livestock

Equipment such as captive-bolt guns and firearms are considered to be grossly contaminated. They need to be appropriately and regularly cleaned for the equipment to be in proper working order. Consult the euthanizing equipment manufacturer's guidelines and disinfect according to the product label. In general, conduct the following:

1. Dry clean the equipment to remove the gross contaminants.
2. Clean and scrub¹⁶ the devices with disinfectant at the location where they were used.
3. Clean and disinfect the equipment again at the access corridor.
4. Equipment requiring servicing should be placed in a disinfected plastic bag.

¹⁶ Follow manufacturer's guidelines.

Attachment 15.J Cleaning and Disinfecting Egg Handling Materials

Egg handling materials covered in this attachment include

- packing materials
- plastic flats, pallets
- dividers, and
- materials constructed of wood (pallets, divider board, and tic-tacs).

These procedures recommend minimum steps for cleaning and disinfecting plastic, washable egg handling materials. Alternative procedures to achieve C&D objectives may be used as required by specific circumstances.

Disinfectants

Follow manufacturer's directions for concentration and for contact time when using EPA-approved disinfectants. Disinfectants should be applied to clean surfaces. Each operator should evaluate drying time post disinfectant application to ensure prescribed contact time is achieved.

Mechanical Washing and Sanitation of Plastic (Impervious Surfaces) Egg Handling Materials

Pre-Operation

1. Confirm that C&D equipment is clean and ready for operation.
2. Ensure that water levels are correct, temperature of wash water is at target temperature (90°F minimum), chemical supply lines for detergents and sanitizers are connected, concentrations are at suppliers (equipment) recommendations, and that fresh water supply line is open.
3. Record and sign Operation Log noting date and time, temperature of wash and rinse, detergent concentration, and chlorine concentration in rinse.

Operation

1. Introduce washable flats, pallets, and dividers (tic-tacs) into washing system after all pre-operation checks are successfully completed.
2. Maintain operating log noting the
 - a. temperature of wash and rinse waters,
 - b. detergent and chlorine concentrations, and
 - c. condition of wash water from excessive foaming and build-up of egg.

Note: Systems using manual addition of detergents will require frequent monitoring for detergent and chemical strength compared to systems using online monitoring of detergent concentration. Chlorine in rinse must be at or above 50 ppm and less than 100 ppm.

3. Visually inspect after C&D to confirm that the egg handling materials are free of egg or other organic soil. If not clean, use a brush on observed areas and repeat the cleaning and sanitation cycle to completely remove any observed organic matter.
4. Make corrective changes as required to operate system within established ranges for temperature and chemical concentrations. Note and record corrective actions in the operating log.
5. At mid-shift, drain wash-water tank and perform mid-shift cleaning.
6. Repeat pre-operational checks before starting operations.

Manual Cleaning and Disinfection of Plastic (Impervious Surfaces) Egg Handling Materials

Pre-Operation

1. Review the [EPA-approved list](#) of registered disinfectants for suitable disinfectants.
2. Assemble equipment (brushes, high-pressure washer, low-pressure spray, or foaming equipment for sanitizer application) and don appropriate PPE.
3. Prepare detergent and sanitizer solutions following manufacturer's directions.
4. Maintain operating log noting temperature of wash and rinse waters, detergent, and sanitizer concentrations.

Operation

[Attachment 15.I](#), Cleaning and Disinfecting Equipment, provides more details on manually cleaning and disinfecting equipment.

1. Dry clean by brushing or scraping to remove accumulated organic matter and soil.
2. Wash with detergent solution using brushes or high-pressure washer and rinse with clean water.
3. Inspect for cleanliness and repeat wash procedure if not clean.
4. Apply sanitizing solution and allow sanitizing surfaces to dry.

Manual Cleaning and Disinfection of Wood Based (Porous Surfaces) Egg Handling Materials

Pre-Operation

1. Review the [EPA-approved list](#) of registered disinfectants for suitable disinfectants. Note that Lombardi et al. (2008) reported that citric acid (1 percent), calcium hypochlorite

(750 ppm), acetic acid (5 percent), and iodine/acid based disinfectants were effective disinfectants on wood surfaces.¹⁷

2. Assemble appropriate equipment (PPE, brushes, high-pressure washer, low-pressure spray, or foaming equipment for sanitizer application) and prepare detergent and sanitizer solutions following manufacturer's directions.
3. Maintain operating log noting temperature of wash and rinse waters, detergent, and sanitizer concentrations.

Operation

1. Dry clean by brushing or scraping to remove accumulated organic matter and soil.
2. Wash with detergent solution using brushes or a high-pressure washer and rinse with clean water.
3. Inspect for cleanliness and repeat wash procedure if not clean.
4. Apply sanitizing solution and allow sanitizing surfaces to dry.

Post Operation Handling of Cleaned and Disinfected Egg Handling Materials

1. Clearly label cleaned and disinfected plastic egg handling materials palletized on clean pallet as "Cleaned and Disinfected."
 - a. Include date and time.
 - b. Additional labeling may be required when the cleaned and disinfected materials are to be returned to the farm of origin.
2. Store cleaned and disinfected materials in a dry area separate from those used for incoming shell eggs and unwashed egg handling materials.

Operations within Control Areas or Receiving Eggs from Flocks in a Control Area

Additional procedures and documentation are required when operating in a Control Area (CA) or receiving eggs from flocks in a CA, as defined by either the State Veterinarian's Office or an APHIS Veterinary Representative.

Operations include

1. procedures for maintaining materials by flock of origin,
2. documentation confirming segregation of materials and return to origin if used,
3. every location or company providing C&D procedures in cases where they have and handle non-washable types of materials in the event of an FAD outbreak, and

¹⁷ M. E. Lombardi, B. S. Ladman, R. L. Alphin, and E. R. Benson. 2008. Inactivation of Avian Influenza Virus Using Common Detergents and Chemicals. *Avian Diseases* 52:118–123.

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4. each company developing its own C&D report form; these forms should be available to be copied by others. Forms should include some type of checklist.

Paper Flats and Corrugated Cases

All paper flats and corrugated egg handling materials moving from CAs under permit will be segregated at receiving plant and disposed by incineration or other approved methods determined suitable for local circumstances. (See the Disposal SOP.)

Attachment 15.K Cleaning and Disinfecting Tankers, Lines, and Silos for Liquid Egg Products

Tankers, lines, and silos will undergo cleaning in place (CIP). Procedures require appropriate system design to ensure wetting of all surfaces and maintenance of design velocity, temperature, and chemical strengths.

Procedures

1. Prepare CIP system as defined for the plant.
2. Execute CIP ensuring the minimal time, temperature, concentration, and flow requirements outlined in the following tables are met.

Tankers

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	7.0 minutes	150°F	1.5–2.5%	70 gal/min
Rinse	3.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Lines

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	10.0 minutes	150°F	1.5–2.5%	≥ 5 ft/sec
Rinse	5.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Note: Apply an acid rinse as needed to remove mineral build-up (minimum 5,000 ppm).

Silos

Process	Time	Temperature	Concentration	Flow
Pre-rinse	5.0 minutes	Ambient		
Caustic Wash	15.0 minutes	150°F	1.5–2.5%	70 gal/min
Rinse	5.0 minutes	Ambient		
Sanitizer	2.0 minutes	Ambient	1500–2500 ppm	

Note: Apply an acid rinse as needed to remove mineral build-up (minimum 5,000 ppm).

1. Perform a visual inspection on the vessel at the completion of CIP.
2. Document the steps of CIP on the Egg Products CIP Log ([Attachment 15.P](#)).

Please see “Supplement 2 Cleaning and Disinfection Guidelines” from the Secure Egg Supply Plan at www.secureeggsupply.com.

Attachment 15.L OIE Standards for Processing Milk to Destroy the FMD Virus¹⁸

The FMD virus may be present in milk as early as four days prior to clinical signs of the disease becoming evident and may be a means of spreading the disease from farm to farm if proper precautions are not implemented. The World Organization for Animal Health sets the international sanitary standards for trade in animal products. Standards for the treatment of milk for inactivation of the FMD virus are below.

Recommendations for importation from FMD infected countries or zones where an official control program exists (Article 8.6.28)

For milk, cream, milk powder and milk products

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that:

1. these products:
 - a. originate from herds or flocks which were not infected or suspected of being infected with FMD at the time of milk collection;
 - b. have been processed to ensure the destruction of the FMD virus in conformity with one of the procedures referred to in Article 8.6.38. and in Article 8.6.39.;
2. the necessary precautions were taken after processing to avoid contact of the products with any potential source of FMD virus.

Procedures for the inactivation of the FMD virus in milk and cream for human consumption (Article 8.6.38)

For the inactivation of viruses present in milk and cream for human consumption, one of the following procedures should be used:

1. a sterilisation process applying a minimum temperature of 132°C for at least one second (ultra-high temperature [UHT] pasteurization), or
2. if the milk has a pH less than 7.0, a sterilisation process applying a minimum temperature of 72°C for at least 15 seconds (high temperature—short time [HTST] pasteurization), or
3. if the milk has a pH of 7.0 or over, the HTST process applied twice.

¹⁸ World Organization for Animal Health (OIE). Terrestrial Animal Health Code. Chapter 8.6: Foot and Mouth Disease. 2013. <http://www.oie.int>.

Procedures for the inactivation of the FMD virus in milk for animal consumption (Article 8.6.39)

For the inactivation of viruses present in milk for animal consumption, one of the following procedures should be used:

1. the HTST process applied twice;
2. HTST combined with another physical treatment, e.g., maintaining a pH 6 for at least one hour or additional heating to at least 72°C combined with dessication;
3. UHT combined with another physical treatment referred to in point 2 above.

Please see the Secure Milk Supply website at <http://www.securemilksupply.org/> for additional C&D guidelines for the milk industry products.

Attachment 15.M Animal By-Products

Hay, Feed, and Grains

Some of the most contagious livestock diseases, such as FMD, can survive for extended periods of time under the right climatic and environmental conditions¹⁹ and are transmissible on fomites. Items such as hay, animal feed, and grains will likely be disposed after they have been treated with a disinfectant. (See the Disposal SOP.)

1. Treat the hay, feed, and grains with an [EPA-approved](#) disinfectant for treating the FMD virus.
2. Allow appropriate contact time.
3. Prepare the items for disposal. (See the Disposal SOP.)

Wool²⁰

Because the FMD virus is transmissible via fomites, wool must be properly treated to prevent disease spread. Wool harvested from animals infected with FMD can harbor the virus for weeks depending on temperature and humidity levels. Viruses present in wool can be inactivated through industrial washing, fumigation, industrial scouring, or storage.

Industrial Washing

Immerse the wool in a series of baths of water, soap, and sodium hydroxide (soda) or potassium hydroxide (potash).

Fumigation

1. Place potassium permanganate in containers (which must NOT be made of plastic or polyethylene).
2. Add commercial formalin.
3. Ensure the correct amounts of each (53 ml of formalin and 35 g per cubic meter of potassium permanganate).
4. Hermetically seal the chamber for at least 24 hours.

Industrial Scouring

Immerse the wool in a water-soluble detergent held at 60–70°C.

Storage

Store the wool at 18°C for 4 weeks, or 4°C for 4 months, or 37°C for 8 days.

¹⁹ The FMD virus survives at 4°C for two months on wool, 2-3 months on feces or slurry, and reportedly can survive for more than 6 months on soil surface under snow (Bartley, Donnelly, & Anderson, 2002).

²⁰ World Organization for Animal Health (OIE). Terrestrial Animal Health Code. Chapter 8.6: Foot and Mouth Disease. 2013. Article 8.6.35. <http://www.oie.int>.

Manure

1. Identify an appropriate location for stacking manure. The location should satisfy the following:
 - a. Have an impermeable base.
 - b. Be further than 10 meters from a watercourse.
 - c. Be more than 50 meters from a spring, well, or borehole for human consumption or farm usage.
 - d. Does not pose odor problems.
2. Stack manure on site.
3. Add 100 kg of granulated quick lime to each cubic meter of material. The stack should be heated to a temperature of at least 70°C throughout.
4. Spray with a 4% washing soda solution or a FMD-approved disinfectant.
5. Allow treatment to last at least 42 days.
6. See [Attachment 15.N](#) Sample Disinfectant Mixing Protocol for Virkon® S.

Training and certification is required for personnel assigned to mix Virkon® S. Safety and protective gear are required when mixing Virkon® S. Those assigned must wear a face shield or safety goggles, a dust mask, and rubber gloves.

Mix the solution in a separate, well-ventilated room (if possible), or outside. Restrict the number of people in the mixing area. Follow the requirements for handling and storage of disinfectant.

Equipment and Supplies

Equipment and supplies needed for Virkon® S include the following:

- Safety equipment
 - Face shield or safety goggles
 - Rubber gloves
 - Coveralls
 - Dust mask.
- Supplies
 - 1-, 2½-, or 5-gallon plastic container with locking lid
 - Funnel
 - Plastic measuring spoon or scoop (a scoop is included with the Virkon® S).

Mixing Procedure

Prepare a 1 percent solution (1.3 ounces of Virkon® S concentrate to 1 gallon of water—see Table 15.M-1) as follows:

1. Fill the tank halfway with water (some solution or plain water must be in the tank before adding Virkon® S powder).
2. To avoid the drift of the chemical dust, open the plastic bag of Virkon® S inside the tank.
3. Add Virkon® S powder to water and stir gently. **DO NOT STIR VIGOROUSLY.** The solution should be yellow in color and have a slight citrus odor.
4. Reseal the container holding Virkon® S powder.
5. Using a funnel, pour the Virkon® S solution into the 1-, 2½-, or 5-gallon plastic container. Close the container tightly.
6. Dispose of the solution after 7 days or when it begins to change from yellow to clear.
7. Wash hands and any other areas where the solution or powder may have come in contact with the skin. Clean the mixing area.

Table 15.M-1. Mixing Guidelines for Virkon® S

Tank Size (gal)	Mixing Guidelines (1.3 oz Virkon® S/gal of water)							
	Remaining solution in the tank (gal)	20	40	60	80	100	120	140
220	Virkon® S added (lb)	16.3	14.6	13	11.4	9.8	8	6.5
	Add water to 220 gal	200	180	160	140	120	100	80
195	Remaining Solution in the tank (gal)	20	40	60	80	100	120	140
	Virkon® S added (lb)	14.2	12.6	11	9.3	7.7	6	4.5
	Add water to 220 gal	175	155	135	115	95	75	55
119	Remaining Solution in the tank (gal)	20	40	60	80	100	120	140
	Virkon® S added (lb)	8	6.4	4.8	3.2	1.5	NA	NA
	Add water to 220 gal	99	79	59	39	19	NA	NA

Handling

Store the powder in a tightly closed plastic container in a cool, dry place. Ensure that the area where Virkon® S is stored is secured and cannot be accessed by unauthorized people. Follow the instructions on the label for disposal.

Calculation Formula

The calculation formula is as follows (for 1.3 oz Virkon® S/gal of water):

$$\begin{array}{l} 220 \text{ gal} \\ \text{Tank:} \end{array} \quad 220 \text{ gal of water} \times 1.3 \text{ oz Virkon}^{\circledR} \text{ S} = \frac{286\text{oz}}{16\text{oz/lb}} = 17.9\text{lb Virkon}^{\circledR} \text{ S}$$

$$\begin{array}{l} 195 \text{ gal} \\ \text{Tank:} \end{array} \quad 195 \text{ gal of water} \times 1.3 \text{ oz Virkon}^{\circledR} \text{ S} = \frac{253.5\text{oz}}{16\text{oz/lb}} = 15.8\text{lb Virkon}^{\circledR} \text{ S}$$

$$\begin{array}{l} 119 \text{ gal} \\ \text{Tank:} \end{array} \quad 119 \text{ gal of water} \times 1.3 \text{ oz Virkon}^{\circledR} \text{ S} = \frac{154.7\text{oz}}{16\text{oz/lb}} = 9.6\text{lb Virkon}^{\circledR} \text{ S}$$

Attachment 15.N Sample Disinfectant Mixing Protocol for Virkon® S

Training and certification are required for personnel assigned to mix Virkon® S. Those assigned must wear a face shield or safety goggles, a dust mask, and rubber gloves, and safety and protective gear are required when mixing Virkon® S.

Mix the solution in a separate, well-ventilated room (if possible) or outside. Restrict the number of people in the mixing area. Follow the requirements for handling and storage of disinfectant.

Equipment and Supplies

Equipment and supplies needed for Virkon® S include the following:

- Safety equipment
 - Face shield or safety goggles
 - Rubber gloves
 - Coveralls
 - Dust mask.
- Supplies
 - 1-, 2½-, or 5-gallon plastic container with locking lid
 - Funnel
 - Plastic measuring spoon or scoop (a scoop is included with the Virkon® S).

Mixing Procedure

Prepare a 1 percent solution (1.3 ounces of Virkon® S concentrate to 1 gallon of water—see Table 15.N-1) as follows:

1. Fill the tank halfway with water (some solution or plain water must be in the tank before adding Virkon® S powder).
2. To avoid the drift of the chemical dust, open the plastic bag of Virkon® S inside the tank.
3. Add Virkon® S powder to water and stir gently. **DO NOT STIR VIGOROUSLY.** The solution should be yellow in color and have a slight citrus odor.
4. Reseal the container holding Virkon® S powder.
5. Using a funnel, pour the Virkon® S solution into the 1-, 2½-, or 5-gallon plastic container. Close the container tightly.
6. Dispose of the solution after 7 days or when it begins to change from yellow to clear.
7. Wash hands and any other areas where the solution or powder may have come in contact with the skin. Clean the mixing area.

Table 15.N-1. Mixing Guidelines

Tank Size (gal)	Mixing Guidelines (1.3 oz Virkon® S/gal of water)							
3220	Remaining solution in the tank (gal)	20	40	60	80	100	120	140
	Virkon® S added (lb)	16.3	14.6	13	11.4	9.8	8	6.5
	Add water to 220 gal	200	180	160	140	120	100	80
195	Remaining Solution in the tank (gal)	20	40	60	80	100	120	140
	Virkon® S added (lb)	14.2	12.6	11	9.3	7.7	6	4.5
	Add water to 220 gal	175	155	135	115	95	75	55
119	Remaining Solution in the tank (gal)	20	40	60	80	100	120	140
	Virkon® S added (lb)	8	6.4	4.8	3.2	1.5		
	Add water to 220 gal	99	79	59	39	19		

Handling

Store the powder in a tightly closed plastic container in a cool, dry place. Ensure that the area where Virkon® S is stored is secured and cannot be accessed by unauthorized people. Follow the instructions on the label for disposal.

Calculation Formula

The calculation formula is as follows (for 1.3 oz Virkon® S/gal of water):

$$\begin{array}{l} \text{220 gal} \\ \text{Tank:} \end{array} \quad 220 \text{ gal of water} \times 1.3 \text{ oz Virkon® S} = \frac{286\text{oz}}{16\text{oz/lb}} = 17.9\text{lb Virkon® S}$$

$$\begin{array}{l} \text{195 gal} \\ \text{Tank:} \end{array} \quad 195 \text{ gal of water} \times 1.3 \text{ oz Virkon® S} = \frac{253.5\text{oz}}{16\text{oz/lb}} = 15.8\text{lb Virkon® S}$$

$$\begin{array}{l} \text{119 gal} \\ \text{Tank:} \end{array} \quad 119 \text{ gal of water} \times 1.3 \text{ oz Virkon® S} = \frac{154.7\text{oz}}{16\text{oz/lb}} = 9.6\text{lb Virkon® S}$$

Attachment 15.O Sample Virkon® S—Mix Report Daily Log

The following is a sample Virkon® S Mix Report.

Tank #	Date	Name of person mixing the chemical	Chemical amount (gal)		Remarks (please also indicate if you fill in an incident report)
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		
			Remaining (gal)		
			Added Powder (lb)		
			Total (gal)		

General rules for using the log sheet:

- Record all information in ink.
- Sign and date the bottom of the entry page.
- Strike through an error with only a single line and add your initials and the date.
- Never remove pages from a logbook.

Attachment 15.P Egg Products CIP Log

The following is a sample Egg Products CIP Log.

Plant: _____

Date: _____

Vessel ID	Time CIP (start)	Time CIP (end)	Inspection	Initial

Perform a concentration check once per shift on a (1) silo, (2) tanker, and (3) line.

Shift 1

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Shift 2

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Shift 3

Vessel	Caustic Concentration	Sanitizer Concentration	Initial
Tanker			
Line			
Silo			

Supervisor Review: _____

Attachment 15.Q Abbreviations

3D	depopulation, disposal, and decontamination
APHIS	Animal and Plant Health Inspection Service
C&D	cleaning and disinfection
CA	Control Area
CFR	Code of Federal Regulations
CIP	cleaning in place
CRZ	Contamination Reduction Zone
EPA	Environmental Protection Agency
ERAS	Environmental and Risk Analysis Services
EZ	Exclusion Zone
FAD	foreign animal disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMD	foot-and-mouth disease
GIS	geographical information systems
HTST	high temperature—short time
IC	Incident Commander
ICS	Incident Command System
IP	Infected Premises
IT	information technology
NAHEMS	National Animal Health Emergency Management System
NVS	National Veterinary Stockpile
OIE	World Organization for Animal Health

OSHA	Occupational Safety and Health Administration
PPD	Policy and Program Development
PPE	personal protective equipment
PSI	pounds per square inch
SOP	standard operating procedure
SZ	Support Zone
UHT	ultra-high temperature
USDA	United States Department of Agriculture
VS	Veterinary Services